

Cont. Subcl. 1
AP
Cont.
distance such that the same is substantially equal to the width of one pixel row.

REMARKS

Claims 1-6 have been rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Hackleman (U.S. Patent 5,640,183) in view of Hasumi (JP 60-104335). This rejection is respectfully traversed.

The present invention relates to a method of printing a substrate with an inkjet printing device comprising a first printing stage in which a strip of pixel rows is provided with ink drops, whereafter the printhead is displaced in a direction substantially parallel to the pixel columns and a second printing stage in which the strip is provided with supplementary ink drops, wherein the printhead is displaced over a distance such that the same is substantially equal to the width of one pixel row.

The Hackleman reference discloses in column 4, lines 19-35, a system which uses two different nozzles to deposit the droplets on each pixel from the same printhead, thereby establishing a degree of redundancy in that only under the conditions that both nozzles selected for the particular pixel are not functioning properly, will the system fail to deposit a droplet of ink on the designated pixel. Thus, the same image is printed using a different set of inkjet nozzles by depositing one drop of ink at each of the already printed pixels using

a different nozzle. Thus, every pixel is printed with two ink drops originating from two different nozzles. Accordingly, only under the conditions that both nozzles selected for the particular pixel are not functioning properly, will the system fail to deposit a droplet of ink on the designated pixel. The patentee further explains that in an optimum situation, the likelihood of a failure due to a single missing nozzle is reduced to very close to zero, estimated at 1 per billion print dots (see column 4, lines 47-49). In other words, when applying the teachings of the Hackleman patent, one skilled in the art would certainly acknowledge that there would be no need for interrupting or prolonging the printing because of failures of individual nozzles simply because the chance of such failures becoming visible is substantially zero. In such a situation, it is clear that there would be no incentive for one skilled in the art to look for ways to prevent the interruption or prolonging of printing due to print failures inasmuch as print failures are substantially non-existent. In any event, even if arguendo, one skilled in the art would be attempted to apply the teachings of the Hasumi reference, it would be realized that in order to implement the teachings of the Hasumi patent, the Hackleman printhead would have to be changed such that each nozzle would be given a reserve nozzle (see Figs. 1, 3 and 4 and the accompany description). This would greatly reduce the productivity of the Hackleman printhead by approximately 50%, since one out of every two nozzles would no longer be a regular print nozzle. Such a

productivity loss would not be acceptable in order to merely overcome the missing of one printed dot per one billion dots as would be the case when considering the Hackleman teaching. Accordingly, one skilled in the art would not seriously consider combining the teachings of the Hasumi reference with that of the Hackleman patent in an attempt to suggest the present invention.

Accordingly, in view of the above amendments and remarks, reconsideration of the rejection and allowance of all of the claims of the present application are respectfully requested.

Conclusion

In the event there are any matters remaining in this application, the Examiner is invited to contact Mr. Joseph A. Kolasch, Registration No. 22,463 at (703) 205-8000 in the Washington, D.C. area.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

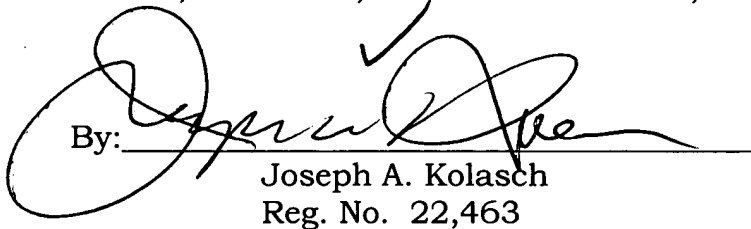
Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicant respectfully petitions for a one (1) month extension of time for filing a response in connection with the present application and the required fee of \$110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit

Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By: 
Joseph A. Kolasch
Reg. No. 22,463

JAK/clb

P. O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

Enclosure: Marked Up Version of Amendments
Abstract of the Disclosure



Appl. No.: 09/635,798
Art Group Unit 2861
January 25, 2002
Page 8

MARKED UP VERSION OF THE AMENDMENTS

IN THE ABSTRACT

Please replace the Abstract of the Disclosure with the attached new Abstract of the Disclosure located at the end of this Amendment.

RECEIVED
JAN 30 2002
2800 MAIL ROOM

IN THE SPECIFICATION

Please amend the specification to read as follows:

Page 2

Please replace the paragraph beginning at line 17 (bridging pages 2-3), with the following new paragraph:

Accordingly, an object of the method according to the present invention is to obviate these disadvantages. To this end, a method has been developed in which the print head is displaced over a distance such that the same is substantially equal to the width of one pixel row. In other words, selection of the position occupied by a second (and any following) print head is no longer a random choice but is made with the fixed displacement over a distance equal to the width of one pixel row. It has been found that this gives better masking of any printing fault as a result of a deviation of a nozzle. This method is based on the realization [realisation] that systematic deviations of the nozzles can be masked more satisfactorily by a systematic distribution of the printing faults

due to such deviations, than is possible with a random distribution of said printing faults. The systematic principle associated with these deviations is that each nozzle always ejects ink drops in the same way. In other words, if a specific nozzle results in ink drops being ejected at a deviant angle (so that the ink drops are printed at a place deviating from the normal position of a location), said nozzle will always eject the ink drops at the same deviant angle. The reason for this is not entirely clear, but might be that the angle at which an ink drop is ejected is significantly determined by the shape and direction of each nozzle, which are substantially invariable in time. Due to the presence of this systematic deviation, it is not necessary to distribute any faults in nozzles at random over the substrate. On the contrary, by making use of the systematic deviation of each nozzle it is possible to obtain better masking of printing faults.

IN THE CLAIMS

Please amend the claims to read as follows:

6. (Amended) An apparatus for printing a substrate with ink drops, image-wise, which comprises

an inkjet printing device containing at least one print head provided with at least [lest] one row of nozzles,

said substrate forming a regular field of pixel rows and pixel columns, the

resolution of the pixel columns being equal to the resolution of the row of nozzles,

means for initiating a first printing stage in which a strip of pixel rows is provided with ink drops, said print head being displaced in a direction substantially parallel to the pixel columns, and

means for initiating a second printing stage in which the strip is provided with supplementary ink drops, wherein the print head is displaced over a distance such that the same is substantially equal to the width of one pixel row.

--ABSTRACT OF THE DISCLOSURE

A method of printing a substrate with ink drops, image-wise, utilizing an inkjet printing device containing at least one print head provided with at least one row of nozzles, the substrate forming a regular field of pixel rows and pixel columns, the resolution of the pixel columns being equal to the resolution of the row of nozzles, wherein a first printing stage is initiated in which a strip of pixel rows is provided with ink drops, whereafter the print head is displaced in a direction substantially parallel to the pixel columns, and a second printing stage is initiated in which the strip is provided with supplementary ink drops, wherein the print head is displaced over a distance such that the same is substantially equal to the width of one pixel row.--